West Virginia Engineering Standard

Hillside Ditch (Ft.)

Definition

A channel that has a supporting ridge on the lower side constructed across the slope at definite vertical intervals and gradient, with our without a vegetative barrier.

Scope

This standard applies to the planning and design of hillside ditches on steep land. It does not apply to diversions (362) or terraces (600).

Purpose

To control the flow of water in sloping areas by diverting runoff to a protected outlet, thus minimizing erosion and runoff.

Conditions where practice applies

Areas that have sufficient soil depth for constructing a hillside ditch system. ***They shall not be used as a substitute for Diversions or Terraces and will not be used to provide protection to buildings, roads or other improvements.[1]***

Planning considerations

Water Quantity

1. Effects upon components of the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, and deep percolation, and ground water recharge.

2. Effects of snowcatch and melt on water budget components.

Water Quality

1. Filtering effects of vegetation on movement of sediment and dissolved and sediment-attached substances.

2. Effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances by runoff.

3. Effects on the visual quality of the water resources.

4. Short-term and construction-related effects of this practice on the quality of downstream water.

5. Potential for development of saline seeps or other salinity problems resulting form increased infiltration in the presence of restrictive layers.

Design criteria

Location. Hillside ditch systems shall be designed to fit land conditions. They shall drain from the ridge to a stable outlet.

Outlets. Adequate outlets shall be provided before beginning construction to dispose of discharge without creating an erosion hazard. Such outlets may be natural waterways or a constructed one, a stable watercourse, or stable disposal area, such as well-established pasture.

Length. ***The maximum length draining in one direction should be held to 400 ft. or less; however, the*** length may be extended to 500 ft. if necessary to reach a stable outlet.

Grade. The ditch grade may be either constant or variable but must not exceed 3 percent.

Side slopes. Side slopes shall be stable for the soil in which the ditch is constructed. ***However, side slopes will be no steeper than the following:***

Material	*Side Slope*
Sand or Silt, With Clay Binder	*2:1*
Heavy Clay or Silty Clay	*1 1/2:1*
Gravel, clean	*2:1*
Sand, clean	*1:1*
Solid Rock	*1/4:1*
Loose rock or cemented gravel (cut)	*1:1*

Horizontal spacing and cross-sectional area. The maximum horizontal spacing and minimum cross-sectional area per 100 ft of ditch shall be as follows:

Average Land Slope	Maximum spacing	Minimum cross-sectional area per 100 ft. of length
pct	ft	ft^2
12 or less	40	0.35
12 - 25	35	.3
25 - 40	25	.2

Vegetation. Disturbed areas shall be vegetated as soon as practicable after grading. Vegetation shall be done in accordance with the standard for Critical Area Planting (342).

Erosion Control. Measures that control erosion and prevent sedimentation during construction will be incorporated in the design.

Operation and Maintenance

An operation and maintenance plan shall be developed for the area treated. The plan shall be provided to, and discussed with, the land operator. Items that should be considered in the plan are:

1. Periodic inspections.

2. Maintenance of the area by mowing or chemical weed control, where appropriate.

3. Repair of eroding areas.

4. Maintenance of vegetation by fertilization, liming, and/or reseeding.

Plans and Specifications

Plans and specifications for constructing hillside ditches shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Specifications may be developed from applicable NEH-20 specifications or West Virginia 700 series specifications. The attached specification may also be used with the following guidlines:

1. Limits of Hillside Ditch construction will be shown on the drawings.

2. Grade, spacing and typical sections of the ditches will be shown on the drawings.

3. Special measures to control erosion and prevent sedimentation, when planned, will be shown on the drawings.

4. Disposal methods and areas for disposal of trash and debris will be shown on the drawings.

5. Vegetative requirements will be shown on the drawings or in an appropriate seeding specification.

1 Bold Italics added by West Virginia

Construction Specification

Preparation of sites for hillside ditch construction shall be done in a manner which destroys as little vegetation outside the areas to be occupied by the ditches as feasible. Special efforts shall be made to save trees of significant value.

All dead furrows, ditches, or gullies to be crossed shall be filled before construction begins or as part of construction. Fence rows or other obstructions that will interfere with the successful operation of hillside ditches shall be removed.

Construction shall be done in such a way that chemicals, fuels, lubricants, and waste materials will not pollute air and water. Erosion, air pollution, and water pollution will be minimized and held within legal limits.

Measures and construction methods that prevent erosion and control sediment shall be incorporated as shown on the drawings.

The earth materials used in constructing the earthfill portions of the ditches shall be obtained from the ditch channel or other approved sources. Earthfill shall be compacted by routing the construction equipment over the fill in such a manner that the entire surface of the fill will be traversed by not less than one track or tire width of the equipment.

A protective cover of vegetation shall be established on all exposed surfaces where soil and climatic conditions permit. Lime and fertilizer shall be spread at the specified rate and shall be disked into the soil to a depth of 4 inches to prepare a seedbed. Seed and mulch shall be applied at the specified rate. In some cases, temporary vegetation may be used for protection until conditions are suitable for establishment of permanent vegetation.

Where soil or climatic conditions do not permit the establishment of vegetation, and protection is needed, nonvegetative means such as mulches or gravel may be used.

All work shall be done such that the installed practice gives a completed and finished appearance.